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ABSTRACT

Peer interaction was found to be an effective instructional strategy for the acquisition of conservation in 41 normal second and third grade students and 18 learning disabled students (9-14 years old). After a pretest on a conservation task, nonconserving Ss were paired with conserving Ss in a social interaction situation. Post test results indicated that the learning disabled Ss profited from the social situation as much as the normal Ss. (CL)

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PEER INTERACTION AS A CATALYST FOR CONSERVATION ACQUISITION IN NORMAL AND LEARNING DISABLED CHILDREN[1]

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While Piaget has emphasized the importance of interaction with the objects of one's environment in helping to promote cognitive growth, some psychologists have placed more emphasis on social factors. Social psychologists state that the development of cognitive operations is facilitated when several individuals are required to coordinate their actions. They argue that the interaction needed for the growth of intelligence is not so much between the individual and the objects in the environment as it is between the individual and other people, especially with one's peer group.

Piaget, while himself not a social psychologist, appears to be aware of and concerned with the important role of social interaction in cognitive development. " Human intelligence develops in the individual in terms of social interactions too often disregarded" (Piaget, 1971, pp. 224-225). "Without interchange of thoughts and cooperation with others, the individual would never come to group his operations into a coherent (logical whole)" (Piaget, 1947, p. 163). Experience with peers helps to curb the egocentrism of preoperational children (approximately 2-7 years of age) by helping them to consider others' perspectives, i.e., to decenter, without losing sight of their own perspective in the process.

Several American researchers examined the effects of affective and particularly social factors on the child's intellectual development. They reasoned that if experience with peers does in fact help

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to curb the egocentrism of preoperational children, progress into concrete operations should be related to the amount and kind of peer exposure a child experiences, i.e., the more affectively positive the child's peer interactions, the greater the chance to progress toward mastery of concrete operations. If intellectual life and affective life are not only parallel but interdependent, as suggested by Piaget, children with a high frequency of positive social encounters should have an intellectual advantage over less popular children and those who are emotionally disturbed.

It was found that popular children within a given age range were to some extent more likely to have attained conservation than their peers (Goldschmid, 1968; Rardin & Moan, 1971). Other investigators have found emotionally disturbed, institutionalized children to be slower at overcoming egocentrism (Neale, 1966) and slower in achieving conservation (Goldschmid, 1967), suggesting that disruptive personality characteristics may delay cognitive development. It is important to note, however, that the relationship between these factors are correlational rather than causal. None of the cited studies were directed toward substantiating the hypothesis that popularity and peer relatedness in and of themselves had an effect on earlier achievement of conservation. Instead, they focused on the fact that they tend to develop in a parallel manner. According to Piaget (1965), the development of social and individual logic are two inseparable entities, and, therefore, no causal relation can be established between them.

While these authors realize as well as appreciate the important role of social interaction in cognitive development, none have actually examined the mechanisms of cognitive change. In addition, their concern has been with the <u>amount</u> and not with the nature and

quality of the interactions.

New lines of research among Piagetians, especially in Europe, have begun to examine more closely the influence of human interactions on cognitive change. Doise and his colleagues (Doise, Mugny, and Perret-Clermont, 1975; Mugny, Doise, and Perret-Clermont, 1976; Perret-Clermont, 1976) have carried out a series of studies which suggest that "social logic" and "operational logic" are not two separate entities. Instead, they have demonstrated, as has Murray (1972), that social interaction exercises a causal effect on cognitive development. Their research suggests that the introduction of a discrepant point of view by a peer may be sufficient to redirect thinking in a way which provokes conflict. In their learning studies, Inhelder, Sinclair, and Bovet (1974) clearly demonstrated that conflict and apparent contradictions among the positive and negative aspects of a given situation tend to set in motion a dialectic process which advances cognitive change. Through social interactions, a child is required to listen to and interact with discrepant points of view. These differences in opinion force children to reorganize what they already know and to generate new explanations. It is the overcoming of contradictions which enables the child to progress to higher and higher levels of equilibrium. (For an extended explanation of the equilibration process see Reid, in press-a).

These findings suggest support for the position articulated by a number of Italian educational psychologists (e.g., Freinet, 1969; Cecchini, Tonucci, Pinto, and Dubs, 1972) who have argued that social interaction may prove effective as a compensatory instructional strategy for children who are educationally disadvantaged. They hold that rather than highly structured, non-interactive classes, classes which encourage children to work together may minimize the effects of

educational handicaps. Social interaction could assume an importance beyond its social and emotional impact as a modality for both normal and remedial instruction.

The present study, a replication of the Doise et al., and Murray paradigms, began to explore that possibility. The following questions were addressed: Would normal and/or learning disabled children who were required to exchange and coordinate discrepant points of view with their peers be enabled to reach levels of structuring which similar children could not reach alone? Would this type of interaction be effective in facilitating the cognitive growth of the learning disabled, who often experience difficulty in their perceptions of the social process itself? Would there be evidence that the children in both groups restructured their thinking or would they offer only the same explanations of conservation as the peers with whom they interacted? Would both groups of children maintain progress on a delayed posttest?

METHOD

Subjects

Forty-one normal second-and third-grade, middle-class children were randomly selected from a suburban school. The second graders consisted of 13 girls and 12 boys, between the ages of 7.0 and 8.1 ($\bar{X}$=7.4). The third graders consisted of eight girls and eight boys, between the ages of 8.0 and 9.2 ($\bar{X}$=8.5). Eighteen learning disabled children matched for sex, IQ (range 85-105), and socio-economic level, but not for age (range 9.2-14.1,$\bar{X}$=10.7) were also included in the sample. These children experienced difficulties in reading, arithmetic, and perceptual-motor development and attended

a private school. Fifteen children who were diagnosed as having learning disorders related to communication disorders were originally selected (range 5.2 - 9.0: $\bar{X}$ = 6.8). Since only one was able to conserve and none profited from the experience, they were eliminated from data analysis.

Procedure

Pretest. Children were tested individually on a conservation of liquids task to determine whether they conserved. Each child sat next to the examiner at a small table and was told that she/he would be playing a game with juice. First, the children needed to establish that the two glasses placed in front of them were identical, i.e., held the same amount of liquid. Children were then asked to judge whether the amount of juice in the glasses was still equivalent after a transformation, i.e., pouring liquid from one glass into a taller, thinner glass. Third, children were asked to explain their final judgements, i.e., why they thought the amount of liquid had been conserved or had changed.

Children were considered conservers if they were able to state without hesitation that the quantities of liquid were conserved, despite the number or nature of pourings carried out. Acceptable justifications included identity, compensation, and reversibility. Children were considered nonconservers if they believed that the quantity of liquid increased or decreased as a function of the size of the glass (Inhelder, Sinclair, & Bovet, 1974).

Social interaction phase. This phase of the experiment took place approximately one half hour after the pretest. Three children randomly selected from the same class, were brought together in the

experimental room. In each group, two children were conservers and one child was a nonconserver. The nonconserving child was told to sit at the head of the table with the two conservers seated on either side, facing each other. The experimenter told the children that they would be playing a game with juice that would be a little different from the one they had played earlier in the day. The nonconserver, since it was his/her party, was asked to pour the juice from a plastic pitcher for his/her guests to share so that everybody would have the same amount and so that each guest would be happy. One of the conservers was given a tall, thin glass and the other was given a short, fat glass identical to that of the nonconserver. Only when all three children had agreed that everybody at the party had the same amount of juice to drink were the children allowed to drink the juice. Arguments offered by the children were recorded.

Posttest. Approximately one hour after the social situation, the posttest was administered. It consisted of a conservation of liquid task similar to that used in the pretest except that a short, wide glass was used. Only the nonconservers in each group were administered the posttest. Explanations given by the nonconservers were recorded.

Delayed posttest. A second posttest, identical to the first, took place approximately two months later.

Control situation. The control groups consisted of 10 nonconservers, six normal and four learning disabled children randomly selected. These children were asked to pour the juice when no other children were in their presence. The examiner asked the children individually to pour the juice into three glasses, two

identical ones and one shorter, wider glass so that the examiner's friends, who would be arriving shortly, would all have the same amount to drink, and would all be happy. These children were administered a pretest and then a posttest with the same time interval between the two sessions as those in the experimental situation.

RESULTS

Of the 41 normal second and third grade boys and girls, 25 conservers and 16 nonconservers were identified. Only 10 of the nonconservers participated in the social situation. The other six acted as controls. Four conservers and 14 nonconservers were found in the learning disabled group. Ten of the nonconservers participated in the social situation. The other four acted as controls. Learning disabled conservers were asked to attend more than one party since there were so few of them. Conservers and nonconservers were always from the same classroom.

Chi-square analysis indicated that the normal children who were initially nonconservers and randomly assigned to experimental and control situations conformed to expectations generated by previous research. Only one of the ten children who participated in the parties was unable to conserve on the posttest, while no one in the control group was able to conserve afterwards (X^2 =12.537; $p < .001$). Among the learning disabled, nine nonconservers conserved after the social situation, while one did not. Of the learning disabled in the control group, all four maintained nonconservation responses (X^2 = 10.08; $p < .01$). Finally, a comparison of the normal and learning disabled children who participated in the experimental situations indicated that the learning disabled profited from the

social situation as much as the normals ($X^2 = 0$; n.s.).

The normal children who participated in the experimental situation often offered arguments during the posttest (e.g., identity, compensation, or reversibility) which were not used by their conserving peers. Even though the learning disabled children gave conserving responses and explanations after the experimental situation, their explanations (with the exception of one child) were always limited to those that had been advanced by their peers during the juice pouring.

Results of the delayed posttest showed that of the nine normal children who had conserved on the original posttest, only one regressed to pretest level. While six of these children maintained their previous arguments, two of them stated different arguments from those given during the first posttest. Among the learning disabled group, five of the nine maintained progress while four regressed. Those who still conserved continued to offer arguments they had heard from their conserving peers. Children with communication disorders were not included.

DISCUSSION

Consistent with previous findings, normal children who were required to exchange and coordinate points of view with their peers were able to reach levels of structuring beyond those of their controls. They often offered arguments during the posttest which were not used by their conserving peers. At no point did any of the children identified as conservers on the pretest fail to conserve. Since conservation performance was, however, scored dichotomously (i.e., children were labeled conservers or nonconservers), it is difficult to determine whether children who demonstrated

growth may have been sensitive to the peer influence because they were at a transitional stage (Inhelder, Sinclair, & Bovet, 1974). At any rate, the gain appears to have been stable, since all of these children demonstrated conservation on the posttest and were able to give a variety of explanations.

Although the learning disabled children appeared initially to have gained as well as the normal children, there are several indications that they did not. First, they were unable to offer any explanations for their conservation responses other than those which they heard from their peers. Second, nearly half of them had regressed to nonconservation responses in the delayed posttest. Finally, even those who continued to give conservation responses were unable to offer any explanations they had not previously heard from their peers. In addition, their performances were qualitatively different from those of normal children (see Reid, in press-b). It was as though the learning disabled had learned a specific response rather than had achieved a new level of structuration.

Only the children with communication disorders failed to profit from the experience. It is difficult to determine whether this failure was due to their young age or to the nature of their disability. Perhaps it should be attributed to both since they had severe difficulties attending to what their peers said and in responding to them.

In conlusion, since a number of normal children maintained progress on a delayed posttest, it appears that cognitive structures formed during social situations were internalized and reactivated at a later date. Peer interaction, therefore, appears to be an effective catalyst and perhaps instructional strategy. The data yielded by the performances of the learning disabled children

suggests that they may <u>appear</u> to have profited from such instruction when in fact they have not or that they may profit to the extent that they have acquired new, specific responses but do not accomodate their previous assimilation schemes under such circumstances (see Piaget, 1977, pp. 73-77). The role of social interaction with such children, therefore, is still at issue. Further research is needed to determine a) the reasons for the failure of the communication disordered children to profit from the social situation, b) whether children at transitional stages are more likely to profit, and c) what there was in the performance of the learning disabled children which limited their gains.

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FOOTNOTE

[1] Shorter versions of this paper were presented at the 8th Annual Symposium of the Jean Piaget Society, Philadelphia, May, 1978 and at the 9th Annual Conference on Piagetian Theory and the Helping Professions, Los Angeles, California, February, 1979.